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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

JobNo: CQCE/BBMP/CTR/W.No.17/2020-21 Date 14.10.2020

GRADATION FOR GSB (Grading V)

Client : **Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency : **Sri. C T Raju,** Contractor, Bangalore.
Name of work : Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
BIS Code : IS 2386 Part (1):1963
Date of Testing : 12.10.2020 to 14.10.2020

Oven Dry Wt (gm) : 13000

TABLE – 1

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Requirements as per MORTH 5th edition table 400.1
75	0	0	0.00	100	100
53	562	562	4.32	95.68	80-100
26.5	2038	2600	20.00	80.00	55-90
9.5	2391	4991	38.39	61.61	35-65
4.75	2007	6998	53.83	46.17	25-50
2.36	3968	10966	84.35	15.65	10-20
0.85	1304	12270	94.38	5.62	2-10
0.425	425	12695	97.65	2.35	0-5

Table 2

Sl. No.	Particulars	Test Results	Requirements as per MORTH 5th edition table 400.2
1	Liquid Limit, %	23.00	25.0% Maximum.
2	Plasticity Index, %	Non Plastic	6.0% Maximum.

Remarks: Satisfies MORTH Specifications as per Table 400-1, Grading V

Note:
1. The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date : : 22.10.2020

GRADATION FOR WMM

Client : **Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency : **Sri. C T Raju,** Contractor, Bangalore.
Name of Work : Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.

IS Code: : IS 2386 (Part 1):1963(RA 2011)
Date of Testing : 22.10.2020
Material Type : Wet Mix Macadam

Oven Dry.Wt, grar 10000

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Requirement as per MORTH 5th edition table no 400.13
53	0	0	0	100	100
45	206	206	2.1	97.9	95-100
22.4	2188	2394	23.9	76.1	60-80
11.2	2354	4748	47.5	52.5	40-60
4.75	1697	6445	64.5	35.6	25-40
2.36	1124	7569	75.7	24.3	15-30
0.600	695	8264	82.6	17.4	8-22
0.075	1502	9766	97.7	2.3	0-5

Note:
1. The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date: 22.10.2020

Aggregate Impact Value

Client	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
IS Code	IS 2386 (Part 4):1963(RA 2011)
Type of Mix	Wet Mix macadam
Date of Testing	22.10.2020

Sl No.	Details	Test No. 1	Test No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	87	89	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	293	293	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.89	23.30	**23.10**

Comments:
→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%(As per MORTH Specication table 400.12)

Note:
→The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date : 22.10.2020

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	**: Sri. C T Raju,** Contractor, Bangalore.
Name of Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
BIS code:	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	22.10.2020

Sl no	Test	1	2	Requirements as per MORTH 5th edition table no 400.12
1	Flakiness Index %	10.6	12.5	Combined Flakiness & Elongation index Max 35%
2	Elongation Index %	11.8	10.4	
	Combined Flakiness & Elongation index	22.40	22.90	

Note:

→ The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date 24.10.2020

ATTERBERG LIMITS TEST FOR WMM

Client : **Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency : **Sri. C T Raju,** Contractor, Bangalore.
Name of Work : Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
IS Code: IS 2720(Part 5):1985
Date of Testing : 22.10.2020 to 24.10.2020
Material Type : Wet Mix Macadam

Sl. No.	Particulars	Test Results	Requirement as per MORTH 5th edition Cl.406.2.1.2
1	Liquid Limit	18.50	-
2	Plasticity Index, %	Non Plastic	6.0% Maximum.

Note:
1.The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date 24.10.2020

ATTERBERG LIMITS TEST FOR WMM

Client : **Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency : **Sri. C T Raju,** Contractor, Bangalore.
Name of Work : Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
IS Code: IS 2720(Part 5):1985
Date of Testing : 22.10.2020 to 24.10.2020
Material Type : Wet Mix Macadam

Sl. No.	Particulars	Test Results	Requirement as per MORTH 5th edition Cl.406.2.1.2
1	Liquid Limit	22.00	-
2	Plasticity Index, %	Non Plastic	6.0% Maximum.

Note:
1.The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No: CQCE/BBMP/CTR/W.No.17/2020-21

Date: 02.11.2020

TEST REPORT ON PAVING BITUMEN

Client	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	**: Sri. C T Raju,** Contractor, Bangalore.
Name of work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
BIS Code	IS 73:2013,IS 1203:1978, IS 1208:1978, IS 1205:1978, IS1448(P-69):1969
Date of Testing	02.11.2020
Type of Mix	**Dense Graded Bituminous Macadam , VG 30**
Source of Location	**Hot Mix Plant**

The results of the tests conducted on the bitumen sample using for Dense Graded Bituminous Macadam

Sl.No	Description	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 0C, 100gms, 5sec, 1/10 mm	50	Min 45
2	Softening point, 0C	54	Min 47
3	Ductility at 250C, cm	99	Min40
4	Flash Point, 0C	256	Min 220

Note:

1. The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

JobNo: CQCE/BBMP/CTR/W.No.17/2020-21

Date: : 02.11.202

TEST RESULTS OF AGGREGATE IMPACT VALUE

Client : **Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.

Agency : **Sri. C T Raju,** Contractor, Bangalore.

Name of work : Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.

Source / Location : Hot Mix Plant, Bangalore

BIS Code : IS 2386 Part (4):1963

Type of Mix : Dense Graded Bituminous Macadam

Date of test : 02.11.2020

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W1 g	385	387	
2	Weight of agregate passing 2.36 mm sieve after the test = W2 g	82	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W3 g	303	303	
5	Aggregate Impact value = percent fines 100* (W2/W1) percent	21.30	21.71	**21.50**

Comments:

→ Maximum allowable Aggregate Impact value for Dense Graded Bituminous Macadam is 27% (Table 500-8 of MORTH specification)

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Note:

1. The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

JobNo: CQCE/BBMP/CTR/W.No.17/2020-21

Date : 02.11.2020

TEST RESULTS OF AGGREGATE SHAPE TEST
(Flakiness & Elongation)

Client : **Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.

Agency : **Sri. C T Raju,** Contractor, Bangalore.

Name of work : Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.

BIS Code : IS 2386 Part (1):1963

Date of Test : 02.11.2020

Type of Mix : Dense Graded Bituminous Macadam

Sl.No.	Flakiness Index Value(%)	Elongation Index Value(%)	Total(Combined Flakiness and Elongation)(%)	Requirements
1	12.30	14.10	26.40	Maximum allowable Combined Flakiness and Elongation Indices for Dense Graded Bituminous Macadam is 35% as per Table 500.8 MORTH Specification.
2	11.50	10.40	21.90	

Note:

1. The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date: 04.11.2020

Specific Gravity And Water Absorption Test

Client	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
IS code:	IS 2386 (Part 3):1963(RA 2011)
Type of Mix	Dense Graded Bituminous Macadam
Date of Testing	02.11.2020 to 04.11.2020

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2019	2021	2023	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1264	1266	1268	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2017	2018	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	751	751	750	
6	Weight of oven dried aggregate	W_4 g	2005	2006	2008	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.670	2.671	2.677	2.673
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.706	2.711	2.714	2.710
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.50%	0.55%	0.50%	0.52%

Comments:

→ Maximum allowable Aggregate Water absorption value for Dense Graded Bituminous Macadam is 2.0%(AS per MORTH specification 5th edition table no 500..8)

3/AEE

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Note:

1. The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date: 02.11.2020

Aggregate Gradation Test

Client	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
BIS Code	IS 2386(Part 1):1963(RA 2011)
Sample I / D	Hot mix Plant, Bangalore.
Type of Mix	Dense Graded Bituminous Macadam
Date of Testing	02.11.2020

Total Weight of Sample: **10000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.10	Remarks
37.50	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
26.50	625	6.3	6.25	93.75	90 - 100	
19.00	1134	11.3	17.59	82.41	71 - 95	
13.20	1058	10.6	28.17	71.83	56 - 80	
4.75	2514	25.1	53.31	46.69	38 - 54	
2.36	1537	15.4	68.68	31.32	28 - 42	
0.300	1491	14.9	83.59	16.41	7 - 21	
0.075	1201	12.0	95.60	4.40	2 - 8	

Total Weight of Sample: **10000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.10	Remarks
37.5	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
26.5	628	6.3	6.28	93.72	90 - 100	
19	1234	12.3	18.62	81.38	71 - 95	
13.2	1248	12.5	31.10	68.90	56 - 80	
4.75	2541	25.4	56.51	43.49	38 - 54	
2.360	1326	13.3	69.77	30.23	28 - 42	
0.300	1226	12.3	82.03	17.97	7 - 21	
0.075	1202	12.0	94.05	5.95	2 - 8	

Note:

1. The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date:06.11.2020

TEST REPORT ON STABILITY OF MIX

Client	:	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	:	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the Work	:	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
Type of Mix	:	Dense Graded Bituminous Macadam
Date of Testing	:	06.11.2020

The results of the tests conducted on the Dense Graded Bituminous Macadam mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.65	10.85	9 Kn (min)
2	Marshal flow, mm	3.28	2.02	2 – 4
3	Percent air voids in Mineral Aggregate	14.39	13.54	13 – 15
4	Voids in Compacted Mix	3.41	5.63	3 – 6
5	Percent Voids filled with Bitumen	70.05	71.59	65 - 75
6	Density, g/cc	2.27	2.26	--

Note:

1. The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date: 06.11.2020

BITUMEN CONTENT AND GRADATION DETERMINATION OF DENSE GRADED BITUMINOUS MACADAM MIX AASHTO T 164 & AASHTO T 30

Client	: Assistant Executive Engineer, Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	: Sri. C T Raju, Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
Date of Testing	06.11.2020

BITUMEN CONTENT DETERMINATION

Description	Test 1	Test 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	477.5	477
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	22.50	23.00
7. Bitumen content in %	4.50	4.60
8. Average	4.55	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Test 1				Requirement as per MORTH table 500.10
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	36.9	36.9	7.7	92.3	90 - 100
19	85.6	122.5	25.7	74.3	71 - 95
13.2	69.2	191.7	40.1	59.9	56 - 80
4.75	85.4	277.1	58.0	42.0	38 - 54
2.360	52.2	329.3	69.0	31.0	28 - 42
0.300	92.3	421.6	88.3	11.7	7 - 21
0.075	30.7	452.3	94.7	5.3	2 - 8

SIEVE SIZE	Test 2				Requirement as per MORTH table 500.10
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	35.6	35.6	7.5	92.5	90 - 100
19	78.4	114	23.9	76.1	71 - 95
13.2	65.2	179.2	37.6	62.4	56 - 80
4.75	92.1	271.3	56.9	43.1	38 - 54
2.360	59.8	331.1	69.4	30.6	28 - 42
0.300	96.2	427.3	89.6	10.4	7 - 21
0.075	30.5	457.8	96.0	4.0	2 - 8

Note:

Þ The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Job No.: CQCE/BBMP/CTR/W.No.17/2020-21

Date: 06.11.2020

BITUMEN CONTENT AND GRADATION DETERMINATION OF DENSE GRADED BITUMINOUS MACADAM MIX AASHTO T 164 & AASHTO T 30

Client	: Assistant Executive Engineer, Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	: Sri. C T Raju, Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
Date of Testing	06.11.2020

BITUMEN CONTENT DETERMINATION

Description	Test 1	Test 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	477.6	477.2
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	22.40	22.80
7. Bitumen content in %	4.48	4.56
8. Average	4.52	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Test 1				Requirement as per MORTH table 500.10
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	30.5	30.5	6.4	93.6	90 - 100
19	62.5	93	19.5	80.5	71 - 95
13.2	61.8	154.8	32.4	67.6	56 - 80
4.75	82.1	236.9	49.6	50.4	38 - 54
2.360	52.9	289.8	60.7	39.3	28 - 42
0.300	96.6	386.4	80.9	19.1	7 - 21
0.075	65.8	452.2	94.7	5.3	2 - 8

SIEVE SIZE	Test 2				Requirement as per MORTH table 500.10
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
37.5	0	0	0	100	100
26.5	36.9	36.9	7.7	92.3	90 - 100
19	72.7	109.6	23.0	77.0	71 - 95
13.2	65.4	175	36.7	63.3	56 - 80
4.75	79.7	254.7	53.4	46.6	38 - 54
2.360	60.4	315.1	66.0	34.0	28 - 42
0.300	92.1	407.2	85.3	14.7	7 - 21
0.075	52.2	459.4	96.3	3.7	2 - 8

Note:

Þ The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

Authorised Signatory

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date: 14.11.2020

TEST REPORT

Client	:	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	:	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the work	:	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
IS Code	:	IS 73:2013, IS 1203:1978(RA 2008), IS 1205:1978(RA 2009), IS 1208:1978(RA 2009), IS 1209:1978(RA 2009)
Source of location	:	Hot mix Plant, Bangalore, VG 30
Date of testing	:	14.11.2020

The results of the tests conducted on the bitumen sample using for Bituminous Concrete

Sl. No	Description	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	49	Min 45
2	Softening point, ^{0}C	56	Min. 47
3	Ductility at 27^{0}C, cm	> 100	Min. 40
4	Flash Point, ^{0}C	257	Min. 220

Note:
1. The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21

Date: 14.11.2020

Aggregate Impact Value

Client	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
BIS Code	IS 2386(Part 4):1963
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	14.11.2020

Sl No.	Details	Test No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	383	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	81	83	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	302	
4	Aggregate Impact value = percent fines 100* (W_2/W_1) percent	21.15	21.56	**21.35**

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%(MORTH table no.500.16)

Note:

⇒ The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21

Date : 14.11.2020

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	: **Sri. C T Raju,** Contractor, Bangalore.
Name of Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Bituminous Concrete
Date of Testing	14.11.2020

Sl no	Test	1	2	Requirements as per MORTH 5th edition table no 500.16
1	Flakiness Index	11.6	12.2	Combined Flakiness & Elongation index Max 35%
2	Elongation Index	10.5	10.7	
	Combined Flakiness & Elongation index	22.10	22.90	

Note:
1. The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21

Date : 16.11.2020

Specific Gravity And Water Absorption Test

Client	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
BIS Code	IS 2386(Part 3):1963
Type of Mix	Bituminous Concrete
Date of Testing	14.11.2020 to 16.11.2020

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2018	2019	2021	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1263	1264	1266	
4	Weight of saturated surface dry aggregate in air	W_3 g	2012	2014	2016	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	749	750	750	
6	Weight of oven dried aggregate	W_4 g	2005	2006	2008	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.677	2.675	2.677	2.676
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.702	2.704	2.706	2.704
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.35%	0.40%	0.40%	0.38%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%(MORTH table 500.16)

Note:

⇒ The material is satisfied as per the requirements.

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21

Date : 14.11.2020

Aggregate Gradation Test

IS : 2386 Part I

Client	: Assistant Executive Engineer, Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	: Sri. C T Raju, Contractor, Bangalore.
Name of the Work	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
BIS Code	IS 2386(Part 1):1963
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	14.11.2020

Total Weight of Sample: **5000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	391	7.82	7.82	92.18	90 - 100	
9.5	425	8.50	16.32	83.68	70 - 88	
4.75	634	12.68	29.00	71.00	53 - 71	
2.36	657	13.14	42.14	57.86	42 - 58	
1.18	511	10.22	52.36	47.64	34 - 48	
0.600	533	10.66	63.02	36.98	26 - 38	
0.300	489	9.78	72.80	27.20	18 - 28	
0.150	375	7.50	80.30	19.70	12 - 20	
0.075	536	10.72	91.02	8.98	4 - 10	

Total Weight of Sample: **5000** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies Bituminous concrete Grade-II specification as per MORTH
13.2	368	7.36	7.36	92.64	90 - 100	
9.5	526	10.52	17.88	82.12	70 - 88	
4.75	749	14.98	32.86	67.14	53 - 71	
2.36	638	12.76	45.62	54.38	42 - 58	
1.18	589	11.78	57.40	42.60	34 - 48	
0.600	527	10.54	67.94	32.06	26 - 38	
0.300	439	8.78	76.72	23.28	18 - 28	
0.150	258	5.16	81.88	18.12	12 - 20	
0.075	499	9.98	91.86	8.14	4 - 10	

Note:

1. The material is satisfied as per the requirements.

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For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date : 17.11.2020

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Assistant Executive Engineer, Yeshwanthpura Sub Division, BBMP, Bangalore.
AGENCY	: Sri. C T Raju, Contractor, Bangalore.
NAME OF THE WORK	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
SAMPLE ID	Hot Mix Plant, Bangalore
DATE OF TESTING	17.11.2020

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.5	472.8
3. Weight of Asphalt and Mineral matter Extracted, g	27.5	27.2
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.5	27.2
7. Bitumen content in %	5.50	5.44
8. Average	5.47	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Test 1				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	13.7	13.7	2.9	97.1	90 - 100
9.5	62.3	76	16.1	83.9	70 - 88
4.75	87.9	163.9	34.7	65.3	53 - 71
2.36	53.2	217.1	45.9	54.1	42 - 58
1.18	41.6	258.7	54.8	45.2	34 - 48
0.600	54.4	313.1	66.3	33.7	26 - 38
0.300	53.6	366.7	77.6	22.4	18 - 28
0.150	20.8	387.5	82.0	18.0	12 - 20
0.075	47.9	435.4	92.1	7.9	4 - 10

SIEVE SIZE	Test 2				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	16.4	16.4	3.5	96.5	90 - 100
9.5	65.9	82.3	17.4	82.6	70 - 88
4.75	94.5	176.8	37.4	62.6	53 - 71
2.36	48.4	225.2	47.6	52.4	42 - 58
1.18	55.2	280.4	59.3	40.7	34 - 48
0.600	54.6	335	70.9	29.1	26 - 38
0.300	30.7	365.7	77.3	22.7	18 - 28
0.150	25.3	391	82.7	17.3	12 - 20
0.075	42.7	433.7	91.7	8.3	4 - 10

Note:

Þ The material is satisfied as per the requirements.

3/AEE

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Testing of Construction Material - Mechanical, Soil, Bitumen, Non Destructive Testing Services, Project Management Consultants, Third Party Quality Assurance, DPR.

Job No.: CQCE/BBMP/CTR/W.No.17/2020-21 Date : 17.11.2020

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Assistant Executive Engineer, Yeshwanthpura Sub Division, BBMP, Bangalore.
AGENCY	: Sri. C T Raju, Contractor, Bangalore.
NAME OF THE WORK	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
SAMPLE ID	Hot Mix Plant, Bangalore
DATE OF TESTING	17.11.2020

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.2	472.7
3. Weight of Asphalt and Mineral matter Extracted, g	27.8	27.3
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.8	27.3
7. Bitumen content in %	5.56	5.46
8. Average	5.51	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Test 1				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	12.9	12.9	2.7	97.3	90 - 100
9.5	51.4	64.3	13.6	86.4	70 - 88
4.75	93.8	158.1	33.5	66.5	53 - 71
2.36	44.7	202.8	42.9	57.1	42 - 58
1.18	49.5	252.3	53.4	46.6	34 - 48
0.600	51.6	303.9	64.4	35.6	26 - 38
0.300	52.2	356.1	75.4	24.6	18 - 28
0.150	30.7	386.8	81.9	18.1	12 - 20
0.075	47.2	434	91.9	8.1	4 - 10

SIEVE SIZE	Test 2				Requirement as per MORTH table 500.17
mm	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	13.7	13.7	2.9	97.1	90 - 100
9.5	64.5	78.2	16.5	83.5	70 - 88
4.75	90.8	169	35.8	64.2	53 - 71
2.36	47.6	216.6	45.8	54.2	42 - 58
1.18	53.3	269.9	57.1	42.9	34 - 48
0.600	52.1	322	68.1	31.9	26 - 38
0.300	45.4	367.4	77.7	22.3	18 - 28
0.150	31.8	399.2	84.5	15.5	12 - 20
0.075	44.9	444.1	93.9	6.1	4 - 10

Note:

Þ The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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Job No.: CQCE/BBMP/CTR/W.No.17/2020-21

Date: 17.11.2020

TEST REPORT ON STABILITY OF MIX

Client	:	**: Assistant Executive Engineer,** Yeshwanthpura Sub Division, BBMP, Bangalore.
Agency	:	**: Sri. C T Raju,** Contractor, Bangalore.
Name of the Work	:	: Compreshensive development of roads, drains and footpath in HMT Layout, SBM Colony and Surrounding Areas in Ward No.17 under PACKAGE-2019-20 RRN-DIV-(10), BBMP, Bangalore.
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	17.11.2020

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	10.03	9.15	9 Kn (min)
2	Marshal flow, mm	2.25	3.49	2 – 4
3	Percent air voids in Mineral Aggregate	13.08	14.37	13 – 15
4	Voids in Compacted Mix	3.77	5.03	3 – 6
5	Percent Voids filled with Bitumen	67.41	73.32	65 - 75
6	Density, g/cc	2.27	2.25	--

Note:
1. The material is satisfied as per the requirements.

For CIVIL QUALITY CONSULTANTS & ENGINEERS

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